IN THE CLAIMS:

1. (Original) A method for extracting feature vectors from a digitized utterance, comprising the steps of:

computing spectral envelope estimates from overlapping frames in the digitized utterance based on a Minimum Variance Distortionless Response (MVDR) method; and

generating cepstral feature vectors from the spectral envelope estimates.

2. (Original) The method of claim 1, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.

3. (Original) A method for generating spectral envelope estimates from a digitized utterance, comprising the step of:

generating the spectral envelope estimates from overlapping frames in the digitized utterance based on a harmonic mean of at least two low- to-high resolution spectrum estimates.

4. (Original) The method of claim 3, wherein the spectral envelope estimates are MVDR spectral envelope estimates comprising a harmonic mean of Linear Predictive Coding (LPC) spectra of all model orders beginning from a first order.

5. (Original) The method of claim 3, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.

6. (Original) A method for reducing variance of a feature stream in a pattern recognition system, comprising the step of:

temporally or spatially averaging the feature stream to reduce the variance of the feature stream.

7. (Original) The method of claim 6, wherein the pattern recognition system is a speech recognition system and the feature stream comprises cepstral vectors.

8. (Original) The method of claim 6, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.

9. (Original) A method for extracting feature vectors with reduced variance from a digitized utterance, comprising the step of:

computing the spectral envelope estimates for each of at least two overlapping segments corresponding to a current overlapping frame in a digitized utterance,

wherein said computing step comprises the steps of:

averaging the spectral envelope estimates for the at least two overlapping segments to obtain a smoothed spectral envelope for the current overlapping frame; and

computing a Mel-Filtered Cepstral Coefficients (MFCC) vector from the smoothed spectral envelope.

10. (Original) The method of claim 9, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.

11. (Original) A method for extracting feature vectors with reduced variance from a digitized utterance, comprising the step of:

computing the spectral envelope estimate from each of at least two overlapping segments corresponding to a current overlapping frame of a digitized utterance,

wherein said computing step comprises the steps of:

computing a Mel-Filtered Cepstral Coefficients (MFCC) vector for each of the at least two segments corresponding to the current overlapping frame, from the spectral envelope estimate; and

averaging together the MFCC vector for each of the at least two overlapping segments to obtain a smoothed MFCC vector for the current overlapping frame.

12. (Original) The method of claim 11, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.

13. (Original) A method for extracting feature vectors from a digitized utterance, comprising the steps of:

segmenting the digitized utterance into overlapping frames that comprise data samples;

for each of the overlapping frames,

splitting the data samples from a start of a current overlapping frame to a start of a next overlapping frame into at least two overlapping segments;

for each of the at least two overlapping segments,

computing a Fast Fourier Transform (FFT) of Minimum Variance Distortionless Response (MVDR) coefficients corresponding to the at least two overlapping segments to generate a sampled version of a discrete-time Fourier Transform of the MVDR coefficients;

placing the sampled version of the discrete-time Fourier Transform into one of a plurality of overlapping bins;

for each of the plurality of overlapping bins,

determining a weighted sum of an inverse of a magnitude of sampled versions of the discrete-time Fourier Transform placed therein to obtain a bin value therefore;

calculating a Discrete Cosine Transform (DCT) of logarithms of bin values in the plurality of bins to produce a feature vector; and

averaging feature vectors obtained from each of the at least two segments to obtain an averaged feature vector for the current overlapping frame.

14. (Original) The method of claim 13, wherein each of the overlapping frames having a frame duration Tf equal to 10 ms and a frame shift Ts equal to 35 ms.

15. (Original) The method of claim 13, wherein bin widths of each of the plurality of overlapping bins are of a uniform Mel-frequency.

16. (Original) The method of claim 13, wherein said computing step comprises the steps of:

performing a high order Linear Predictive Coding (LPC) analysis of the at least two overlapping segments to obtain LPC coefficients therefore; and

computing the MVDR coefficients from the LPC coefficients.

17. (Original) The method of claim 16, wherein a model order of the high order LPC analysis is at least sixty.

18. (Original) The method of claim 16, wherein said step of computing the MVDR coefficients comprises the step of computing a weighted autocorrelation of the LPC coefficients.

19. (Original) The method of claim 13, wherein said step of computing the FFT of the MVDR coefficients comprises the steps of:

zero padding the MVDR coefficients to obtain zero padded MVDR coefficients; and

computing the Fast Fourier Transform (FFT) of the zero padded MVDR coefficients to generate the sampled version of the discrete-time Fourier Transform of the MVDR coefficients.

20. (Original) The method of claim 19, wherein said zero padding step comprises the step of adding zeroes to the MVDR coefficients to make the MVDR coefficients have a predetermined length.

21. (Original) The method of claim 13, wherein said calculating step comprises the step of respectively computing a logarithm of the bin value for each of the plurality of bins.

22. (Original) The method of claim 13, wherein the weighted sum of the inverse of the magnitude of the sampled versions is triangular shaped.

23. (Original) The method of claim 13, wherein said averaging step comprises the steps of:

computing a Mel-Filtered Cepstral Coefficients (MFCC) vector for each of the at least two overlapping segments corresponding to the current overlapping frame; and

averaging MFCC vectors for the at least two overlapping segments to obtain a smoothed MFCC vector for the current overlapping frame.

24. (Original) The method of claim 23, further comprising the steps of:

computing first and second time derivatives from the smoothed MFCC vector for the current overlapping frame; and

re-estimating means and variances of Gaussians and transition probabilities of at least one Hidden Markov Model (HMM) corresponding to the current overlapping frame.

25. (Original) The method of claim 13, wherein said method is implemented by a program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform said method steps.